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December 2001

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Recommended Citation

Swinarski, Matthew; Kishore, Rajiv; and Rao, Raghav, "Impact of ASP Capabilities on Application Service Quality" (2001). *AMCIS 2001 Proceedings*. 355.
<http://aisel.aisnet.org/amcis2001/355>

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IMPACT OF ASP CAPABILITIES ON APPLICATION SERVICE QUALITY

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Abstract

The growth of outsourcing as an information technology system (ITS) governance mechanism has dramatically increased during the 1990s and has recently evolved into a new kind of business model known as application service providers (ASPs). Many organizations are turning to ASP in the belief that these firm posses inherent capabilities making them better equipped to handle the increasing demand, cost and complexity of providing IT products and services. Based in part on the capability maturity model (CMM) research stream, this research investigates two assumptions about the inherent capabilities of vendors to deliver quality information products and services: 1) the technical ability of vendor's personnel and 2) the degree of formalized organizational processes.

Introduction

Empirical studies in information technology and system (ITS) outsourcing have been focused in two main areas: 1) determinant of ITS outsourcing (Ang and Straub, 1998; Grover and Teng, 1993; Lacity and Hirschheim, 1993b; Loh, 1992; Loh and Venkatraman, 1992; McFarlan and Nolan, 1995; Nam, et al., 1996; Poppo and Zenger, 1998; Slaughter and Ang, 1996; Smith, et al., 1998; Teng, et al., 1995) and 2) success factors associated with ITS outsourcing (DiRomualdo and Gurbaxani, 1998; Grover, et al., 1996; Gurbaxani, 1996; Lacity and Willcocks, 1998; Lacity, et al., 1996; Lee and Kim, 1999). A key area, which previous ITS outsourcing literature has failed to directly address, is vendor capabilities. This is surprising considering the literature often cites “access to the capabilities and experience” of the vendor as one of the main reasons why firms outsource (DiRomualdo and Gurbaxani, 1998; Gurbaxani, 1996; Khosrowpour, et al., 1996; Quinn, 1999), and is probably the most critical factor associated with successful ITS outsourcing relationships (DiRomualdo and Gurbaxani, 1998; McFarlan and Nolan, 1995). This research begins to address this void by investigating two assumptions about the impact of vendor’s inherent capabilities on delivering quality information products and services: 1) the technical ability of vendor's personnel and 2) the degree of formalized organizational processes. In order to do so, this research draws on the capability maturity model (CMM) stream of research to identify key organizational process capabilities influencing system, information and service quality in the application service provider (ASP) domain. The CMM area is well-known in software engineering, but has not hitherto been used in ITS outsourcing research.

Research Model

The following paragraphs identify and discuss the rationale for the inclusion of the dependent and independent variables and the individual relationships presented in the research model given in Figure 1.

Application Service Quality (ASQ)

The quality of the service and products provided is paramount to the success of ITS outsourcing relationships (Grover, et al., 1996) and requires sufficient attention in ITS outsourcing research. An application

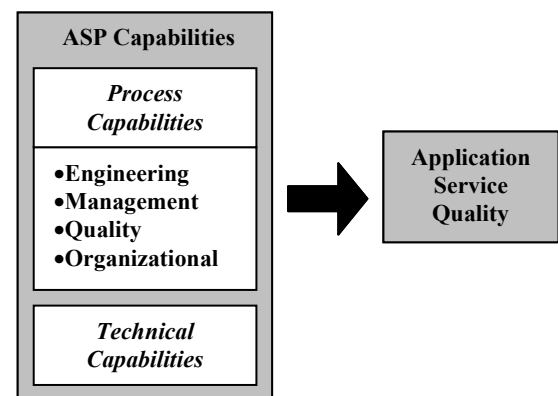


Figure 1. Research Model

service, as with most services (Shostack, 1977), consists of both a service (or functional) element and a product (or technical) element. Service quality refers to the efficiency and manner by which the service is delivered; while product quality is associated with the availability, integration and flexibility of application and the supporting infrastructure, along with the accuracy and relevance of the information produced by the system. Thus, we define application service quality as the customer's satisfaction with ASP performance in terms of both service and product dimensions.

ASP Capabilities

The ITS outsourcing literature suggests that vendor capabilities may take the form of technical capabilities of the organization's personnel (DiRomualdo and Gurbaxani, 1998; Grover and Teng, 1993; Gurbaxani, 1996; Lacity and Hirschheim, 1993a; Quinn, 1999; Slaughter and Ang, 1996; Venkatraman, 1997) and organizational processes that have been developed over time (Lacity and Hirschheim, 1993a; Lacity, et al., 1996).

Technical Capabilities (TC)

Technical capabilities can be classified into two categories: specialist skills and generalist skills (Benbasat, et al., 1980). Specialists contain in-depth knowledge in a particular domain while generalists contain knowledge from multiple related domains, but in lesser detail. Benbasat (1980) stated that specialized domain knowledge is more important in the earlier stages of system development to insure that all requirements are identified and incorporated into the final design, while general knowledge is more critical at the posterior stages of implementation and testing. Empirical studies of software and system development projects have shown a positive relationship between the technical capabilities of software developers and to meeting schedules, reduce production cost and increase product quality (Deephouse, et al., 1995-1996; Krishnan, 1998; Krishnan and Kellner, 1999; Krishnan, et al., 2000; Perry, et al., 1994). Therefore we hypothesize:

Hypothesis 1: There is a positive relationship between ASP's TC and ASQ.

Hypothesis 1A: There is a positive relationship between ASP's specialized TC and ASQ.

Hypothesis 1B: There is a positive relationship between ASP's general TC and ASQ.

Process Capabilities (PC)

Integrating applicable CMM-based processes for software (Paulk, 1993), system (Bate, 1995; Ibrahim, 1997), and information technology service (Niessink and van Vliet, 2000) development, we have defined four process capabilities associated with ASP (see Table 1). Several studies on software and system development (Butler, 1995; Clark, 1997; Dion, 1993; Herbsleb, et al., 1997; Humphrey, et al., 1991; Krishnan and Kellner, 1999; Lawlis, et al., 1995; Wohlwend and Rosenbaum, 1994) have shown that increased levels of process capabilities, as defined by CMM for Software (Paulk, 1993), lead to improvements in product quality, customer satisfaction, productivity, costs, and cycle time. Krishnan et al. (2000) found empirical evidence that software quality processes (i.e. configuration management and quality assurance), as well as processes associated with the early software development stages (i.e. software project planning and software engineering process), significantly affected software product quality. Deephouse et al. (1995-1996) determined that software planning, training and cross-functional team coordination processes improve schedules, budgets and software product quality. Therefore we hypothesize:

Hypothesis 2: There is a positive relationship between ASP's PC and ASQ.

Hypothesis 2A: There is a positive relationship between ASP's engineering PC and ASQ.

Hypothesis 2B: There is a positive relationship between ASP's management PC and ASQ.

Hypothesis 2C: There is a positive relationship between ASP's organizational PC and ASQ.

Hypothesis 2D: There is a positive relationship between ASP's quality PC and ASQ.

Control Variables

Other factors influencing application service/product quality include: market characteristics (degree of competition, industry, and application area) (Krishnan and Kellner, 1999), organizational characteristics (size, age and top management commitment) (Lee and Kim, 1992), and application characteristics (size and complexity) (Deephouse, et al., 1995-1996). Thus, we will control for effect of these variables.

Table 1. ASP Process Capabilities

Process Capabilities	Individual Processes
<u>Engineering Process Capabilities</u> – processes associated with the technical aspects of service development, delivery and maintenance.	<u>Requirements Development</u> – identifies and develops the customer system and service requirements to satisfy the client’s application needs. <u>Development & Maintenance</u> – designs, produces and maintains services and product components and interfaces to meet specified requirements. <u>Integration</u> – implements and integrates both internal and external services and product components so all function as a whole.
<u>Management Process Capabilities</u> – processes associated with provisioning, monitoring and coordinating resources to meet established commitments.	<u>Project Management</u> – establishes reasonable plans and controls to ensure achievement of project objectives. <u>Risk Management</u> – identifies, assesses, monitors and mitigates risks that may adversely impact achieving project objectives. <u>Coordination</u> – ensures that the various service provisioning functions and disciplines effectively communicate, coordinate, and collaborate in order to achieve project objectives. <u>Application Service Evolution</u> – selects and introduces services, equipment, and new technology to better to achieve project objectives.
<u>Quality Process Capabilities</u> – processes associated proactive and reactive measures to ensure established levels of service and product quality are delivered.	<u>Quality Assurance</u> – ensures that service and product components, as well as, the processes used in their development conform to specified requirement. <u>Configuration Management</u> – establishes and maintains data on and status of identified service and product components for analyzing and controlling changes to the service. <u>Validation</u> – confirms that a service fulfills its intended use. <u>Subcontract Commitment Management</u> – ensures subcontract activities are performed in accordance with contractual agreements.
<u>Organizational Process Capabilities</u> – processes associated with providing the business infrastructure that supports the institutionalization of proven process activities.	<u>Organizational Process Focus</u> – ensures that activities associated with development, assessment and improvement of process capabilities are preformed across the organization. <u>Organizational Process Definition</u> – develops and maintains standard processes based on performance data of processes associated with past application service projects. <u>Training Programs</u> – develops the skills and knowledge of individuals so they can perform their roles effectively and efficiently.

Methodology

This research will use a Web-based survey. The research instrument to measure constructs of interest will be adapted based on existing measures. Constructs, along with possible sources of their operational measurement, are presented in Table 2. The pretest of the developed instrument will be carried out with three Ph.D. students in MIS, two full-time MIS faculty members, two practitioners familiar with CMM and three practitioners associate with the ASP industry in order to make refinements and to test the functionality of the Web site.

Table 2. Construct Measures

Constructs	Suggested Sources
Application Service Quality	(Kettinger and Lee, 1997) (Sengupta and Zviran, 1997) (Ives, et al., 1983)
ASP Process Capabilities	(Zubrow, et al., 1994) (Krishnan and Kellner, 1999) (Clark, 1997)
ASP Technical Capabilities	(Boehm, 1981)

References

Available on request.